

## **REMARKS**

### **Claim Disposition**

Claims 1 – 12 are pending in the present application. Claim 13-16, which were previously withdrawn, have been cancelled. Claims 1, 10, and 11 have been amended to more particularly point out and distinctly that which Applicant's claim as their invention.

No new matter has been introduced by these amendments. Support for the amendments may readily be found throughout the specification and particularly at paragraphs 84 – 86 and others. Reconsideration and allowance of the claims is respectfully requested in view of the above amendments and the following remarks.

### **Claim Rejections Under 35 U.S.C. § 103**

Claims 1-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Raychaudhuri, U.S. Patent Publication 2003/0025535, hereinafter referred to as Raychaudhuri; in view of Sim, U.S. Patent No. 5,438,545, hereinafter referred to as Sim. Applicant respectfully traverses. Raychaudhuri is cited in the Office Action as allegedly disclosing:

“a method (see Figs 3-4) for measuring the impedance of driver devices provided in a semiconductor device, wherein a device (output driver) including a pull-up circuit (10) and a pull-down circuit (12) is used, the method comprising:  
joint activating of both the pull-up circuit and the pull-down circuit and  
joint de-activating both the pull-up circuit (10) and the pull-down circuit (12) (see Fig. 3b);”

It is acknowledged in the Office Action that Raychaudhuri “does not disclose the step of determining a first current flowing through the pull-up circuit or the pull-down circuit.”

Sim is cited in the Office Action for allegedly disclosing

“a data output driver (see Fig. 3) comprising a pull-up circuit (I4) and a pull-down circuit (I10). Sim ('545) particularly teaches for determining a first current flow through a pull-down circuit (I10), with jointly activated pull-up and pull-down circuit (see Abstract, lines 4-6)”.

It is suggested in the Office Action that it would have been obvious to incorporate the step of determining the current flow through the pull-down circuit as taught by Sim into Raychaudhuri.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a *prima facie* case of obviousness. *In re Fine*, U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). The Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

Applicants respectfully contend that neither Raychaudhuri nor Sim, whether alone, or in combination, teaches or discloses each element of the invention. Applicant first, respectfully directs the Examiner's attention to note that Claim 1, the only independent claim, has been amended to further clarify the invention. Claim 1 has been amended to recite, for example, that the trimming of the impedance of the driver device occurs during a test being carried out before the regular operation of the semiconductor device.

The specification from the beginning of the application, from the paragraph 1, the “Field of the Invention,” indicates that the invention relates to testing and in particular to the measuring and trimming the impedance of driver devices provided in a semiconductor device. The specification in numerous locations supports the amendment to claim 1. The following supporting references to the application are merely cursory and examples.

As indicated in paragraph 30, the system serves to test semiconductor devices on a disc or wafer and in particular to measure the output impedance of the devices. Paragraph 40 briefly discusses the “later, during regular operation” of the semiconductor device. Paragraph 43 explains what needs to be done “in order to determine how many or which transistors are to be used during the later regular operation of the semiconductor device 3a, and which are not to be used (*i.e.* for adjusting the driver setting and thus the output impedance).”

The measuring and trimming (chosen and fusing) is further discussed in paragraph 59. Paragraphs following paragraph 59 describe the “joint activating both the pull-up circuit and the pull-down circuit”; and the “determining a first current flowing through the pull-up circuit or the pull-down circuit, respectively, with jointly activated pull-up and pull down circuits during the test carried out before the regular operation of the semiconductor device.”

Secondly, Applicant respectfully disagrees with the Examiner’s suggested interpretation that the combination of Raychaudhuri and Sim suggests a method for measuring and trimming the impedance of a driver device in a semiconductor device during a test being carried out before the regular operation of the semiconductor device, with joint activating of both the pull-up circuit and pull-down circuit; and determining a first current flowing through the pull-up circuit or the pull-down circuit, respectively, with jointly activated pull-up and pull-down circuits during the test carried out before the regular operation of the semiconductor device. In particular, to support the rejection that Raychaudhuri teaches jointly activated pull-up and pull-down circuits, the Examiner refers to Figure 3b. However, Figure 3b includes no teaching or disclosure whatsoever that would suggest jointly activated pull-up and pull-down circuits. In fact, Raychaudhuri at paragraphs 59, 61, 63, and 65 clearly indicates that there is not a joint activation of the “push up” and “pull down” circuits 10 and 12. Furthermore, paragraph 59 specifically teaches that they are operated sequentially. Therefore, because Raychaudhuri does not disclose or teach “jointly activated pull-up and pull-down circuits” as suggested in the Office Action, it cannot render Applicant’s claim unpatentable. Thus Claim 1 is allowable; the rejection is improper and should be withdrawn.

Furthermore, as acknowledged in the Office Action, Raychaudhuri does not disclose the step of determining a first current flowing through the pull-up or the pull-down circuit, respectively with jointly activated pull-up and pull-down circuits. In addition, Raychaudhuri specifically is directed to use during operations – “the impedance control circuit is adapted to determine and to output the impedance adjusting values *at regular intervals* (emphasis added).” [Paragraph 30.] The test mode briefly addressed in paragraphs 68 and 69 is not related to a test mode to trim the impedance prior to operation. Likewise, Sim particularly discusses that “the noises that are generated at the data output buffer *during the operation of data* are especially serious.” (emphasis added) [Col 1, lines 12 -14]. Sim does not refer to a method for measuring and trimming the impedance of a driver device in a semiconductor device during a test being carried out before the regular operation of the semiconductor device, with joint activating of both the pull-up circuit and pull-down circuit. As discussed in paragraph 43, “in order to determine how many or which transistors are to be used during the later regular operation of the semiconductor device 3a, . . . , the pull-up circuit 13a is . . . switched on, and . . . the pull-down circuit 13b is switched off.” [Emphasis Added] Hence, Sim does not suggest determining a first current flowing through the pull-up circuit or the pull-down circuit, respectively, with jointly activated pull-up and pull-down circuits during a test carried out before a regular operation of the semiconductor device.

Furthermore, with respect to the Sim patent, Applicant respectfully contends that Sim does not teach or disclose an element of the invention. In particular, Sim does not teach or disclose, “**determining a first current flowing through the pull-up circuit or the pull-down circuit**, respectively, *with jointly activated pull-up and pull down circuits during the test carried out before the regular operation of the semiconductor device.*” (emphasis added) To support the rejection, Lines 4-6 of the Abstract of Sim is cited in the Office Action as allegedly disclosing

“a data output driver (see Fig. 3) comprising a pull-up circuit (I4) and a pull-down circuit (I10). Sim (‘545) particularly teaches for determining a first current flow through a pull-down circuit (I10), with jointly activated pull-up and pull-down circuit (see Abstract, lines 4-6)”.

Applicant respectfully disagrees. Applicant respectfully directs the Examiner's attention to note that the Sim reference never discloses determining the current, through the pull-up or pull down circuit with *jointly activated* pull-up *and* pull down circuits. Sim specifically teaches a first and a second signal for controlling the pull-up (14) and pull-down I10 circuits. There is no teaching whatsoever in Sim to suggest jointly activating the pull-up (I4) and pull down devices (I10) as the Examiner suggests. Moreover, Applicant respectfully contends that the Examiner has mischaracterized the teachings of Sim because analysis of the circuit operation makes it evident that such operation is in fact, not possible. In particular, the specification at Col. 4, lines 8-18 clearly state:

Gates of the N-MOS transistors I10, I11 are connected to the output DOL of the inverter INV2. Therefore, the N-MOS transistors I10, I11 are turned on when the output of DOL of the inverter INV2 reaches a "HIGH" level. When it does, the potential level of the output Dout starts to change to a "LOW" state. As a result, the output Dout starts to discharge to the second ground GND2 via the N-MOS transistor I10 and simultaneously to discharge to the second ground GND2 via the N-MOS transistor I11 and the current sensing resistor  $R_s$ ."

The above description clearly describes the activation of the pull down circuit (I10). Because Sim describes the output Dout as discharging to the second ground GND2, with the activation of the pull-down circuit (I10) it becomes apparent from the description provided that pull-up circuit (the transistor I4) could not be activated as well. Were the pull-up circuit (I4) activated as suggested, there would be no means to have the output Dout discharge to the second ground GND2 as Sim teaches. Therefore, because Sim does not teach "**determining a first current flowing through the pull-up circuit or the pull-down circuit**, respectively, *with jointly activated pull-up and pull down circuits* during the test carried out before the regular operation of the semiconductor device." (emphasis added) it cannot render the Applicant's claim unpatentable. Thus Claim 1 is allowable; the rejection is improper and should be withdrawn.

Finally, to address the amendments incorporated into the claim language, Applicant once again respectfully contends that neither Raychaudhuri nor Sim, whether alone or in combination teach "determining a first current flowing through the pull-up circuit or the pull-down circuit, respectively, *with jointly activated pull-up and pull down circuits*

**during the test carried out before the regular operation of the semiconductor device.”**  
(emphasis added) Therefore, because neither Raychaudhuri nor Sim, whether alone or in combination teaches or discloses an element of claim 1, they cannot render it unpatentable.

In conclusion, neither Raychaudhuri nor Sim, whether alone or in combination teaches or discloses numerous elements of the claims. Therefore, Raychaudhuri or Sim, whether alone or in combination cannot render Applicant's claims unpatentable. Thus, Claim 1 is patentable; the rejection is improper and should be withdrawn.

In view of the above discussion, Claims 2 - 12 depend from Claim 1, and include all of the corresponding limitations thereof. Claim 1 is not taught by Raychaudhuri or Sim, whether alone or in combination, therefore, Claims 2 - 12 cannot be taught by either. Thus, Claims 2 - 12 are allowable; the rejections are improper and they should be withdrawn.

Furthermore, claims 10 and 11 have been amended to clarify that the method of trimming occurs during a test being carried out before the regular operation. The support for such amendment is discussed above. In addition, further support of claim 11 is found at paragraphs 84 -86. The combination of Raychaudhuri and Sim does not suggest a test device jointly activating both the pull-up circuit and the pull-down circuit; and determining a first current flowing through the pull-up circuit or the pull-down circuit, respectively, during the test carried out before the regular operation of the semiconductor device. The test device for selecting the driver setting for at least one other semiconductor device during the test carried out before the regular operation of the at least one other semiconductor device.

Additionally, Applicants respectfully maintain that the Examiner has used an improper standard in arriving at the rejection of the above claims under section 103, which fails to consider the totality of Applicant's invention and the totality of the cited references. More specifically the Examiner has used Applicant's disclosure to select portions of the cited references to allegedly arrive at Applicant's invention. In doing so, the Examiner, in contravention of Section 103, has failed to consider the teachings of the references or

Applicant's invention as a whole. In particular, the Examiner has provided no explanation for the suggested motivation to make the suggested combination, nor has the Examiner identified where in the cited references or the art teaching of such motivation may be found. *In re Fine* specifically requires that the Examiner must meet the burden of establishing the suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references. The explanation in the Office Action provides no such suggestion other than to state that the Raychaudhuri circuit could then perform the function provided by the circuit of Sim. Applicant respectfully disagrees.

If a proposal for modifying the prior art in an effort to attain the claimed invention causes the art to become inoperable or destroys its intended function, then the requisite motivation to make the modification would not have existed. See *In re Fritch*, 972 F.2d at 1265, 23 U.S.P.Q. 2d at 1783 n. 12 (Fed. Cir. 1992). See also *In re Gordon*, 733 F.2d 900, 221 U.S.P.Q.1125 (Fed. Cir. 1984), wherein it was held that, if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. Furthermore, "If the proposed modification of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPS 1959). MPEP 2143.01.

Applicant respectfully contends that the Examiner has not made a *prima facie* case for obviousness because the proposed combination of references would not satisfy the requirements of Section 103. In particular, there is no motivation to make the Examiner's suggested combination because such a combination would render the prior art invention unsatisfactory for its intended purpose and change the principle of operation of one or more of the cited references. In particular the proposed combination of a current sensing of Sim would render the impedance calibration capability of Raychaudhuri inoperable because the operation to sense the noise current of Sim would interfere with the operation of determining the output driver device output impedances of Raychadhuri. The two circuits could not operate together without changing the principle of operation of at least one. In

yet another example, the current and noise measurement function as described by Sim would cause the dummy circuits of Raychaudhuri to improperly perform their dynamic calibration and adjustment for the driver output impedance. In particular, the noise current sensing of Sim would result in an improper current flowing with the circuit of Raychaudhuri and thereby an improper impedance adjusting data as described therein. Therefore, because the proposed combination would render the Raychaudhuri invention unsatisfactory for its intended purpose and change the principle of operation thereof, there is no motivation to make the suggested combination of references; the Examiner has not made a *prima facie* case for obviousness; and Claim 1 may not be rendered unpatentable as suggested. Therefore, Claim 1 is allowable; the rejection is improper, and should be withdrawn.

The amendments and arguments presented herein are made for the purposes of better defining the invention, rather than to overcome the rejections for patentability. The claims have not been amended to overcome the prior art and therefore, no presumption should attach that either the claims have been narrowed over those earlier presented, or that subject matter or equivalents thereof to which the Applicants are entitled has been surrendered.

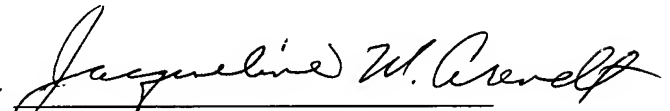


### CONCLUSION

It is believed that the foregoing remarks are fully responsive to the Office Action and that the claims herein should be allowable to the Applicant. Accordingly, reconsideration and allowance of Claims 1 – 12 are respectfully requested. In the event the Examiner has any queries regarding the instantly submitted response, the undersigned respectfully requests the courtesy of a telephone conference to discuss any matters in need of attention.

Respectfully submitted,

ARENDT & ASSOCIATES  
INTELLECTUAL PROPERTY GROUP

By   
Jacqueline M. Arendt  
Attorney for Applicants  
Registration No 43,474

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**Customer No. 44590**

ARENDT & ASSOCIATES INTELLECTUAL PROPERTY GROUP  
1740 Massachusetts Avenue  
Boxborough, MA 01719-2209 USA  
Telephone: (978) 897-8400  
Facsimile: (978) 371-2281